Name _____ Period _____ Date _____

Unit 2

A.3 LABORATORY ACTIVITY: METAL OR NONMETAL—PROCEDURE

Getting Ready

In this activity you will investigate some properties of seven elements and then decide whether each is a metal, a nonmetal, or a metalloid. You will examine the color, luster, and form of each element and will attempt to crush each sample with a hammer. You may also test the substance's ability to conduct electricity. (As an alternative, your teacher may demonstrate this test.) You will also determine the reactivity of each element with two solutions, hydrochloric acid, HCl(aq), and copper(II) chloride, $CuCl_2(aq)$.

Procedure  

1. *Appearance:* Observe and record the appearance of each element, including physical properties such as color, luster, and form. For the purposes of this activity, you can record the form as crystalline (like table salt), noncrystalline (like baking soda), or metallic (like iron).
2. *Conductivity:* If an electrical conductivity apparatus is available, use it to test each sample. **CAUTION:** *Avoid touching the bare electrode tips with your hands; they can deliver an uncomfortable electric shock.* Touch both electrodes to the element sample, but do not allow the electrodes to touch each other. If the lightbulb is connected to the electrodes lights, the sample has allowed electricity to flow through it. Such a material is called a **conductor.** If the bulb fails to light, the material is a **nonconductor.**
3. *Crushing:* Gently tap each element sample with a hammer. Based upon the results, decide whether the sample is **malleable** (flattens without shattering when struck) or **brittle** (shatters into pieces).
4. *Reactivity with acid:*
   a. Label seven wells of a clean well plate *a* to *g*.
   b. Place a sample of each element in its appropriate well. Each sample should either be a 1-cm length of wire or ribbon or 0.2–0.4 g of solid. You can estimate that as no larger than the size of a match head.
   c. Add 15–20 drops of 0.5 M HCl to each well that contains a sample. **CAUTION:** *0.5 M hydrochloric acid (HCl) can chemically attack skin if allowed to remain in contact for a long time.* If any hydrochloric acid accidently spills on you, ask a classmate to notify your teacher immediately. Wash the affected area immediately with tap water and continue for several minutes.
   d. Observe and record each result. The formation of gas bubbles indicates that a chemical reaction has occurred. A change in appearance

of an element sample may also be an indication of a chemical reaction. Decide which elements reacted with the hydrochloric acid and which did not. Record your results.

e. Discard the well-plate contents as instructed by your teacher.

5. *Reactivity with copper(II) chloride:*
   a. Repeat Steps 4a and 4b (see above).
   b. Add 15–20 drops of 0.1 M copper(II) chloride ($CuCl_2$) to each well containing a sample.
   c. Observe each system for three to five minutes—changes may be slow. Decide which elements reacted with the copper(II) chloride and which did not. Recall the criteria you used in the acid test to determine if a reaction occurred. Record each result.
   d. Discard the well-plate contents as instructed by your teacher.
6. Wash your hands thoroughly before leaving the laboratory.

A.3 LABORATORY ACTIVITY: METAL OR NONMETAL

Purpose

The purpose of this activity is to decide if an element is a metal or nonmetal after investigating its chemical or physical properties.

Element	Appearance	Conductivity (optional)	Result of Crushing	Reaction with acid	Reaction with $CuCl_2(aq)$
a.					
b.					
c.					
d.					
e.					
f.					
g.					

Questions

Circle the following that best describes the property tested.

1. **Appearance** Physical Property Chemical Property
   Result of Crushing Physical Property Chemical Property
   Conductivity Physical Property Chemical Property
   Reaction with acid Physical Property Chemical Property
   Reaction with $CuCl_2(aq)$ Physical Property Chemical Property

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Sort the seven coded elements into two groups based on their properties.

2. **Group 1**

_____

Group 2

Which elements fit into either group? Why?

_____

3. _____

_____

4.

Classify each listed element as a Metal Nonmetal or Metalloid

Element	Metal	Nonmetal	Metalloid
a.			
b.			
c.			
d.			
e.			
f.			
g.			